Sunshine Canyon Landfill

Restoration Strategy

for

City South A, B, and C

REPUBLIC SERVICES

ARCHITERRA design group
landscape architecture and planning
10221-A Trademark Street Rancho Cucamonga,CA
ph. (909)484-2800 (888)400-1944 fax (909)280-2802
CA. RLA #2834

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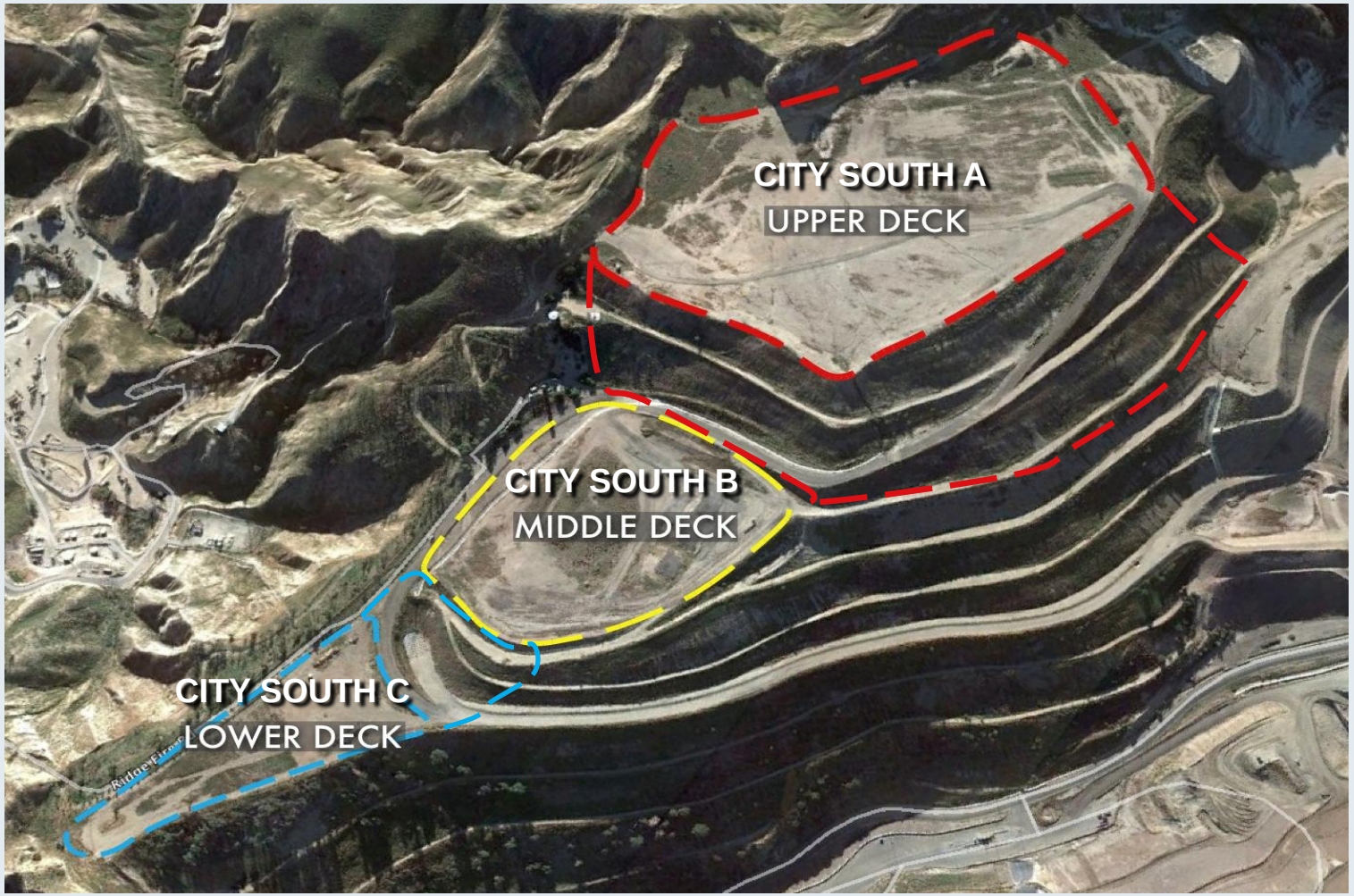
KEY ISSUES:

- MINIMAL GROWTH OF COASTAL SAGE SCRUB MITIGATION
- DOMINATED BY BARE SOIL AND INVASIVE GRASSES AND WEEDS
- HEAVILY COMPACTED SOILS WITH POOR STRUCTURE AND LIMITED NUTRIENTS
- ON-GOING MAINTENANCE CONDUCTED BI-ANNUALLY
- EXISTING IRRIGATION SYSTEM IS LIMITED TO CERTAIN AREAS (PM-10 BERM)
- CONTROLLING VEHICULAR TRAFFIC TO DEFINED ROADS



RECAP OF EXISTING CONDITIONS:

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MANY INVASIVES LIKE RUSSIAN THISTLE, BROME GRASS, FALSE BARLEY, SHORTPOD MUSTARD

RECAP OF EXISTING CONDITIONS:

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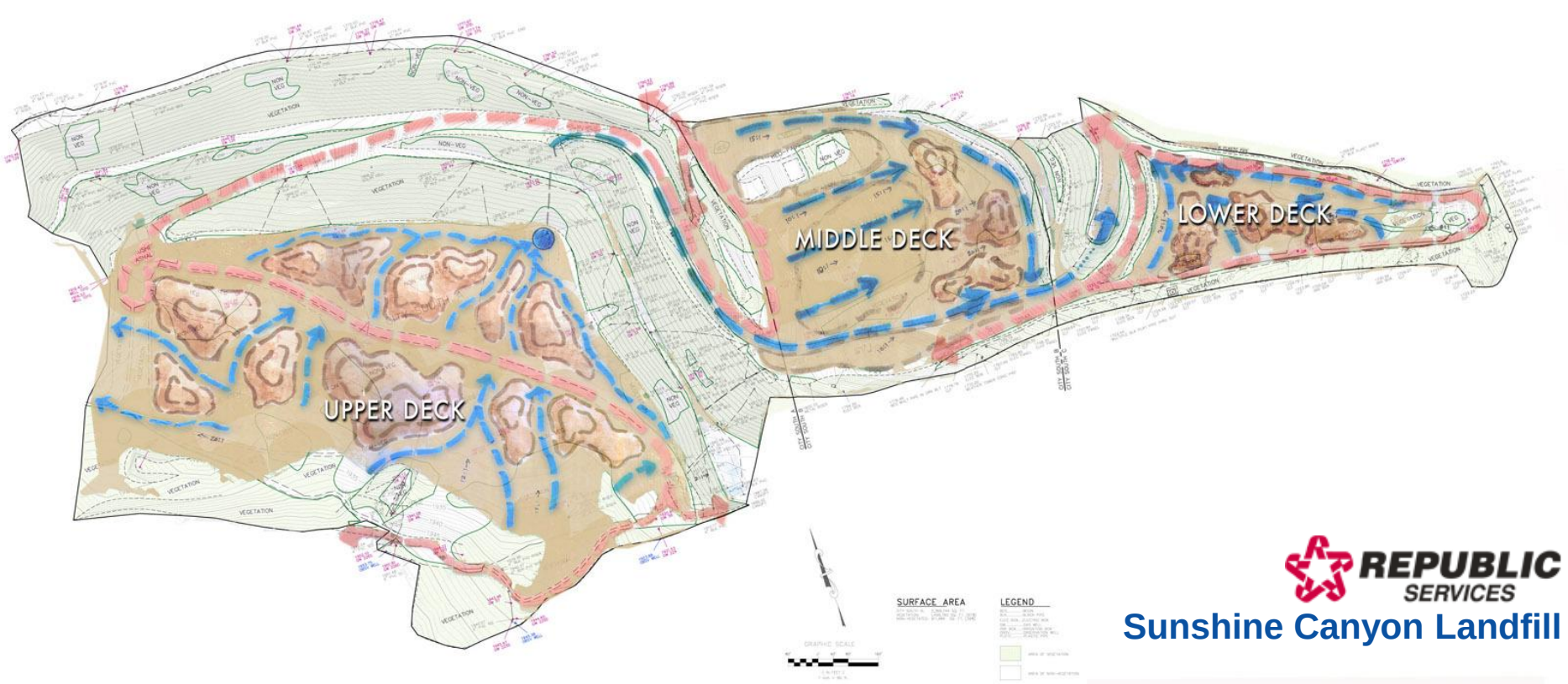
SOME NATIVE SPECIES ON EXISTING MOUNDS
VS. FLAT COMPACTED BARREN PAD AREAS

NATIVE GRASSES PRESENT
IN DRAINAGE RIVULETS

RE-VEGETATION PLAN ANALYSIS:

- MAINTAIN DECK DRAINAGE PATTERNS WITH MINIMAL ALTERATION
- PROVIDE POSITIVE DRAINAGE TO COLLECTION DRAINS
- STABILIZE AREAS OF CONCENTRATION WITH BOULDERS/COBBLE IF NECESSARY



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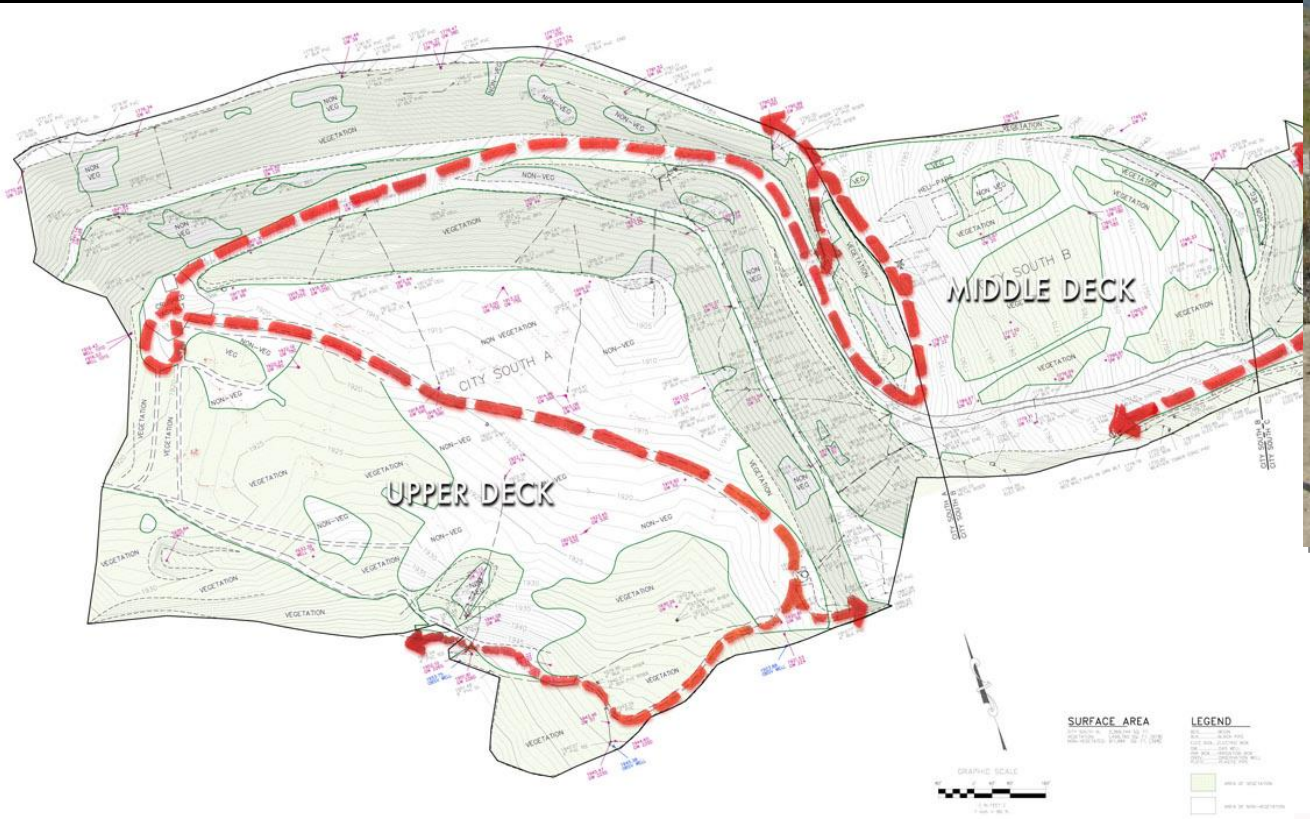
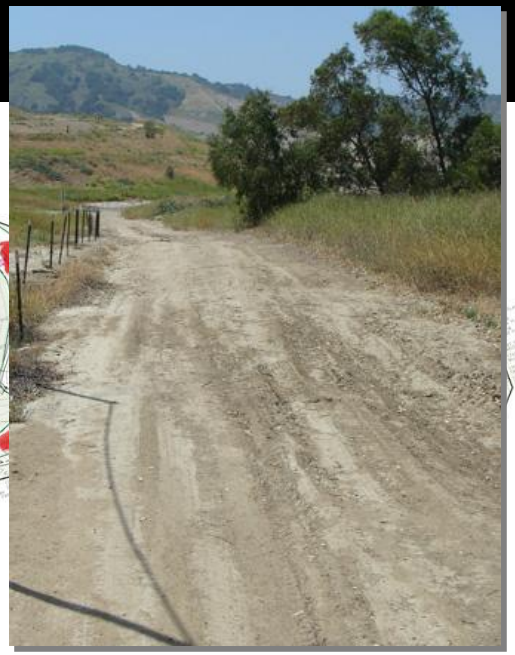
HYDROLOGY

RE-VEGETATION PLAN ANALYSIS:

- IDENTIFY VEHICULAR CIRCULATION PATTERNS
- CONTROL ACCESS ONTO DECKS AND LIMIT VEHICLES TO ROADWAYS
- PROVIDE BARRIER PROTECTION WHERE NEEDED
- PROVIDE SIGNAGE TO HELP IDENTIFY AREAS





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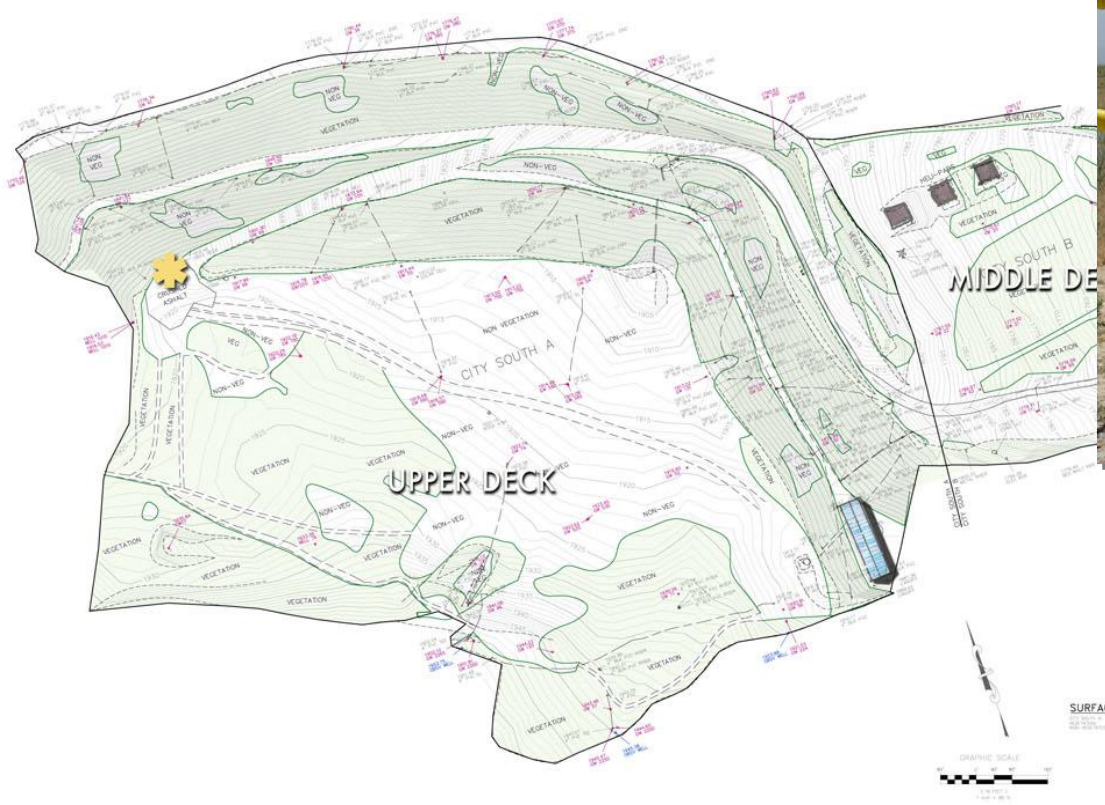
CIRCULATION

RE-VEGETATION PLAN ANALYSIS:

- IDENTIFY EXISTING FEATURES (OBSERVATION DECKS, HELI-PADS, NURSERY, ETC.
- IDENTIFY DECK GAS WELLS, TANKS, PIPING, ETC.
- REVIEW REQUIRED ACCESS ROUTES TO FEATURES/STRUCTURES
- MAP PIPING AND POTENTIAL CONFLICTS WITH IMPROVEMENTS



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EXISTING FEATURES/STRUCTURES

RE-VEGETATION PLAN ANALYSIS:

- EVALUATE EXISTING VEGETATION FOR PROTECTION
- MAP AREAS FOR CROSS RIPPING EXISTING SOIL TO 12” DEPTH
- TAKE SOIL SAMPLES FOR AMENDMENT RECOMMENDATIONS
- IMPORT SOIL AND CREATE MICROTOPOGRAPHY BERMING

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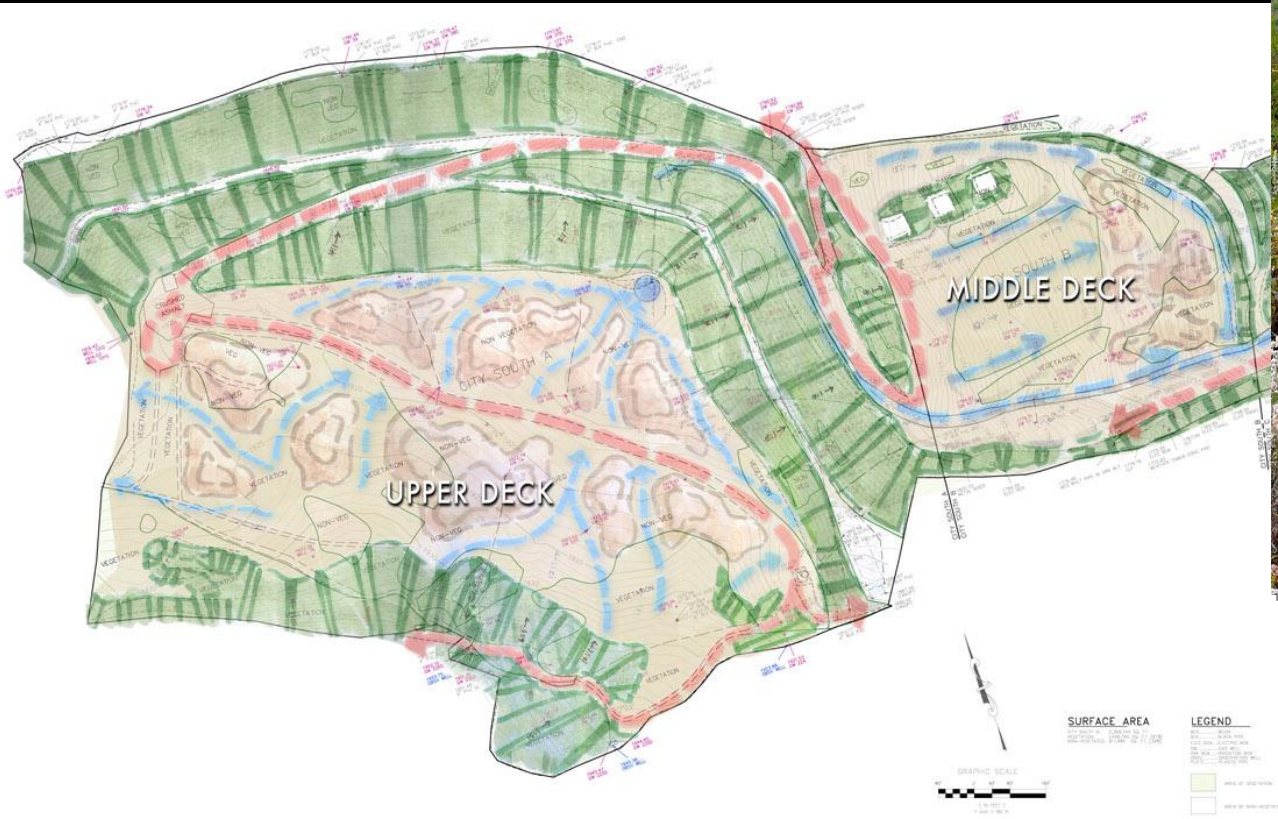
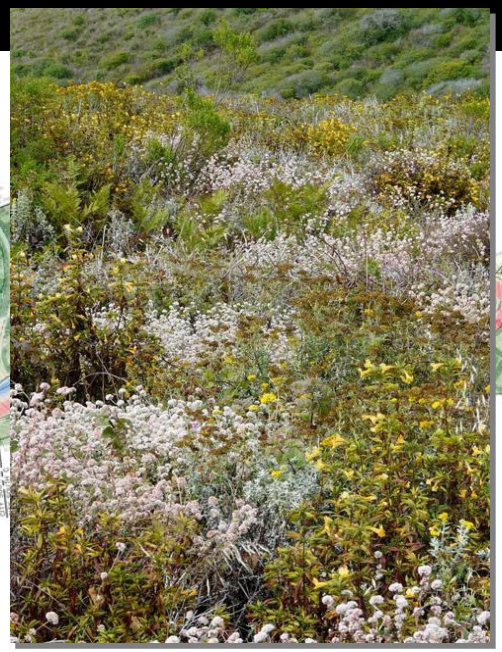
EXISTING SOIL CONDITIONS

RE-VEGETATION PLAN ANALYSIS:

- WEED ERADICATION PROGRAM (HAND/CHEMICAL) TO MINIMIZE COLONIZED NON-NATIVES
- PROVIDE TEMPORARY IRRIGATION SYSTEM (2-3 YEARS) TO HELP WITH INITIAL KILL/GROW CYCLE AND FUTURE ESTABLISHMENT OF NATIVES
- HYDROSEED AND PROVIDE CONTAINER PLANTING PROGRAM
- MONITOR AND PROVIDE MORE FREQUENT MAINTENANCE DURING ESTABLISHMENT AND MONITORING PERIOD





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REVEGETATE SLOPES AND DECKS

RESTORATION STRATEGY:

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MAP TO SUCCESS

RESTORATION STRATEGY:
IMPROVE EXISTING SOILS

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Existing Photos at Soil Collection Areas


A1 Barren with mostly Brome Grass & Thistle

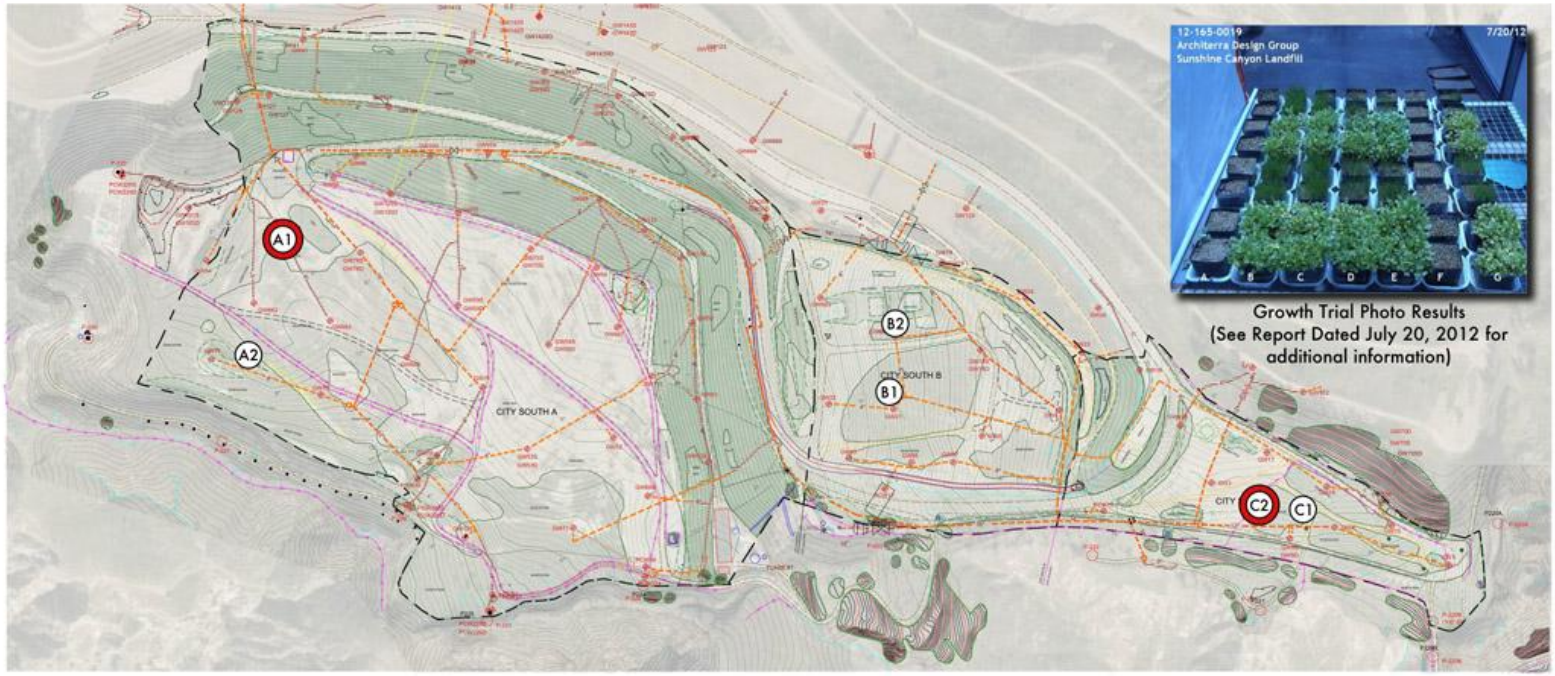

A2 Good diversity of CSS habitat plus some exotics


B1 Good diversity and density of CSS habitat


B2 "Patchy" with mostly Brome Grass & Thistle


C1 Barren of natives with Brome Grass & Mustard


C2 Barren of natives with Brome Grass & Mustard



Growth Trial Photo Results
(See Report Dated July 20, 2012 for additional information)

Soils Test Collection Sites

Growth Trial Test severely impeded -
A1 & C2 have high salinity plus C2 is strongly acidic

Growth Trial Test negative for herbicide contamination
(This also includes the sediment basin soil)

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RESTORATION STRATEGY:
IMPROVE EXISTING SOILS

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Existing Photos at Soil Collection Areas

(A1) Barren with mostly Brome Grass & Thistle

(A2) Good diversity of CSS habitat plus some exotics

(B1) Good diversity and density of CSS habitat

(B2) "Patchy" with mostly Brome Grass & Thistle

(C1) Barren of natives with Brome Grass & Mustard

(C2) Barren of natives with Brome Grass & Mustard

A1 & C2
(ELEVATED SALINITY, STRONGLY ACIDIC)

A2, B1, B2 & C1
(SLIGHTLY HIGH IN SALINITY, LEACHING BY IRRIGATION)

B2 & C1
(LOW ON PHOSPHORUS)

SEDIMENTATION BASIN SOIL
(LOW ON PHOSPHORUS & NEEDS SOIL SULFUR)

RESTORATION STRATEGY:
IMPROVE EXISTING SOILS

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Soil & Plant Laboratory, Inc
Leaders in Soil & Plant Testing Since 1966
www.soilandplantlaboratory.com

Locations:

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Suite G - 173
San Jose, CA 95128
(408) 727-0330

4741 E. Hunter Ave.,
Suite A
Anaheim, CA 92807
(714) 282-8777

Anaheim office
Lab No: 12-165-0014
June 22, 2012

Architerra Design Group, Inc.
10221-A Trademark St.
Rancho Cucamonga, CA 91730

Attn: Richard

SUNSHINE CANYON LANDFILL

Attached are the results of the analyses performed on seven soil samples that were collected from the above mentioned project site and received by Soil and Plant Laboratory on June 13, 2012. These samples were analyzed for nutrient levels and soil suitability in preparation for a new installation of California native plants.

A growth trial to determine herbicide contamination is currently being conducted on each of the seven samples. The results of that testing will be provided under separate cover once those trials are complete.

Analytical Results:

'C2 Bottom Deck'

Salinity (ECe) is very high and was measured at 16.0 dS/m. Few plants would be expected to become established. The greatest contributors to salinity in this sample are very high soluble magnesium and sulfate. The reaction of the soil is very strongly acidic at 3.6 on the pH scale. Few plants would be expected to tolerate this level of acidity. Boron is elevated at 1.32 parts per million (ppm). Under other conditions, this could cause some plants to show tip burning of older leaves but in this case, boron is a minor concern compared to the salinity and pH values. Based on the high salinity, sulfates and magnesium, along with a very low pH, this soil appears to be derived from the Capistrano formation. This will be discussed further in the comments section below.

All other samples

Salinity is elevated in the 'A1 Top Deck' sample at 5.9 dS/m, which is high enough to have a negative effect on the growth performance of a broad range of plants. High soluble magnesium and sulfate are the greatest contributors to salinity in this sample and, along with a relatively low pH, suggest that this soil may be at least partially derived from the Capistrano formation. Thorough leaching irrigations should be applied in this area as described above. We estimate that approximately 3 inches of leaching should bring salinity to a safely low level in the root zone. The subsoil will likely remain saline and salt tolerant plants should be avoided. Consult with your plant provider regarding the salinity tolerance of specific native plants.

Salinity is slightly elevated in the no4 'B2 Mid Deck' and 'C1 Bottom Deck' samples at 3.0 dS/m and 3.7 dS/m, respectively. These levels of salinity could cause some tip burning on the older leaves of salt sensitive plants. However, these values are not especially high and two or three thorough irrigations in those areas should be sufficient to bring salinity to a safely low level in the root zone.

Boron is in the safely low range in all six samples. The safely low sodium adsorption ratio (SAR) values throughout indicate that sodium does not present a hazard to soil structure or water infiltration.

LMP
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AMENDING EXISTING SOILS

Calcium Carbonate Lime (to increase soil pH @ 150lbs. Per 1,000 sq. ft.)

Triple Phosphate (Incorporated into the final cover of Sediment Basin import @ 2.5lbs. Per 1,000 sq. ft. to a depth of 6”)

Soil Sulfur (Lower pH -Incorporated into the final cover of Sediment Basin import @ 10lbs. Per 1,000 sq. ft. to a depth of 6”)

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RESTORATION STRATEGY:

IMPROVE EXISTING SOILS

BENEFITS:

- LOOSENS COMPACTED SOILS
- AERATES SOILS AND IMPROVES SOIL TEXTURE AND POROSITY
- PROVIDES INCREASED WATER AVAILABILITY TO ROOTS
- ALLOWS FOR LEACHING TO REDUCE SALINITY OF SOILS AT SURFACE

CROSS RIPPING OF EXISTING SOILS TO 12” DEPTH

BENEFITS:

- HELPS ADJUST AND CORRECT DEFICIENCES IN SOIL
- PROVIDES BEST CONDITIONS FOR NEW PLANTINGS
- MINIMIZES HYDROPHOBIC SOIL CONDITIONS

MIXING AND BLENDING OF AMENDMENTS

RESTORATION STRATEGY:

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MAP TO SUCCESS

RESTORATION STRATEGY:
CONTROL & LIMIT VEHICULAR ACCESS

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T BAR POSTS AND SIGNAGE

BENEFITS:

- ELIMINATE COMPACTION OF SOILS
- PROVIDE DEFINED ACCESS ROADS
- GATES LIMIT ACCESS TO AUTHORIZED PERSONNEL ONLY
- SIGNAGE TO HELP EDUCATE PERSONNEL
- PROTECTS SENSITIVE HABITAT

RESTORATION STRATEGY:

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MAP TO SUCCESS

- IMPROVE EXISTING SOIL CONDITIONS
- RESTRICT AND LIMIT VEHICLE ACCESS TO PADS
- **CREATE MICRO-TOPOGRAPHIC CONDITIONS TO INCREASE THE VARIABILITY FOR SUCCESSFUL REVEGETATION**

RESTORATION STRATEGY:
MICROTOPOGRAPHY

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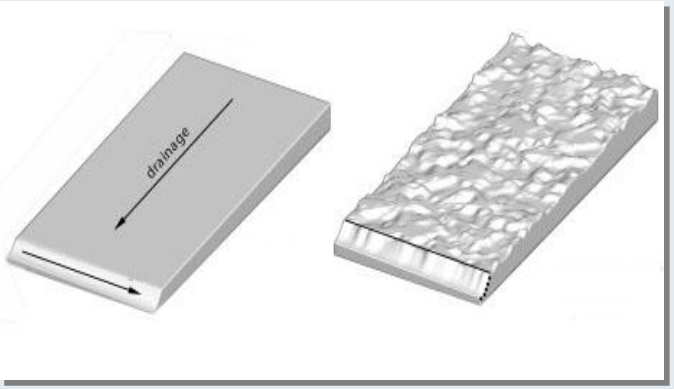

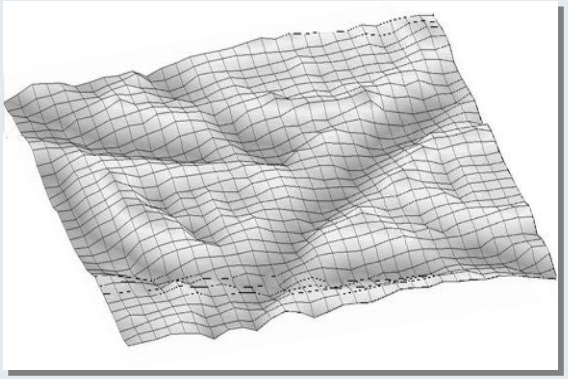

USE OF ON-SITE BOULDERS

BENEFITS:

- PROVIDES DEEPER ROOT ZONE
- OPPORTUNITY FOR ESTABLISHING PLANT SPECIES DIVERSITY
- ELIMINATE PONDING EFFECT ON DECKS AND PROVIDE POSITIVE DRAINAGE
- MIMICS MORE NATURAL APPEARANCE OF PLANT COMMUNITY

EXAMPLE OF
MICROTOPOGRAPHY BERMING

RESTORATION STRATEGY:
MICROTOPOGRAPHY

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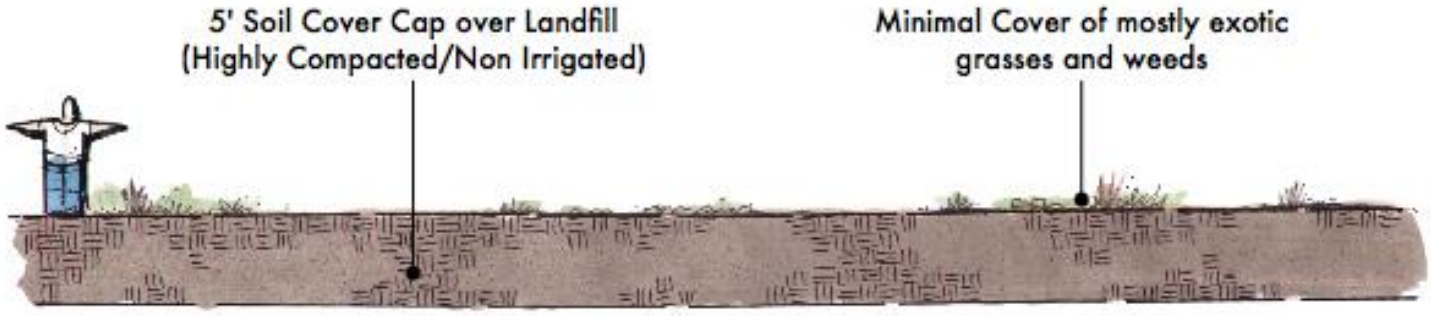
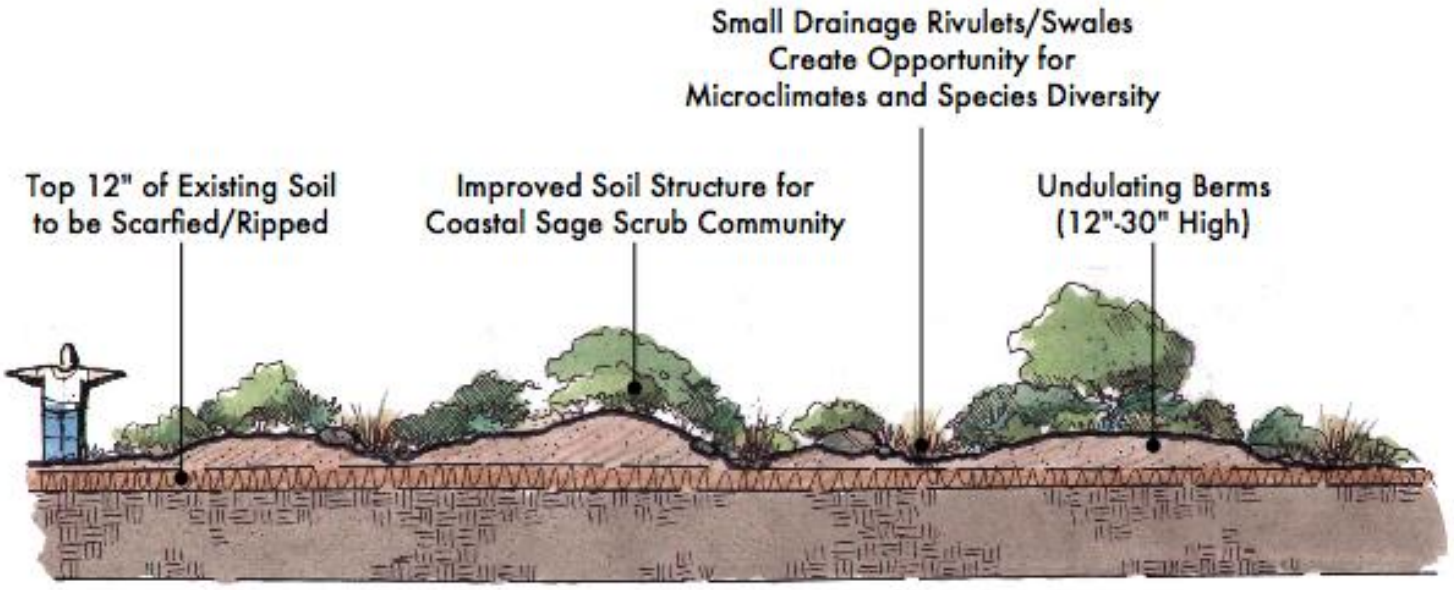


Existing Compacted Pad Section



Proposed Microtopography Berming Section

RESTORATION STRATEGY:

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MAP TO SUCCESS

- IMPROVE EXISTING SOIL CONDITIONS
- RESTRICT AND LIMIT VEHICLE ACCESS TO PADS
- CREATE MICRO-TOPOGRAPHIC CONDITIONS TO INCREASE THE VARIABILITY FOR SUCCESSFUL REVEGETATION
- **ESTABLISH TRIAL PLOT SITE FOR ANALYSIS**

RESTORATION STRATEGY:
ESTABLISHMENT OF TRIAL SITE

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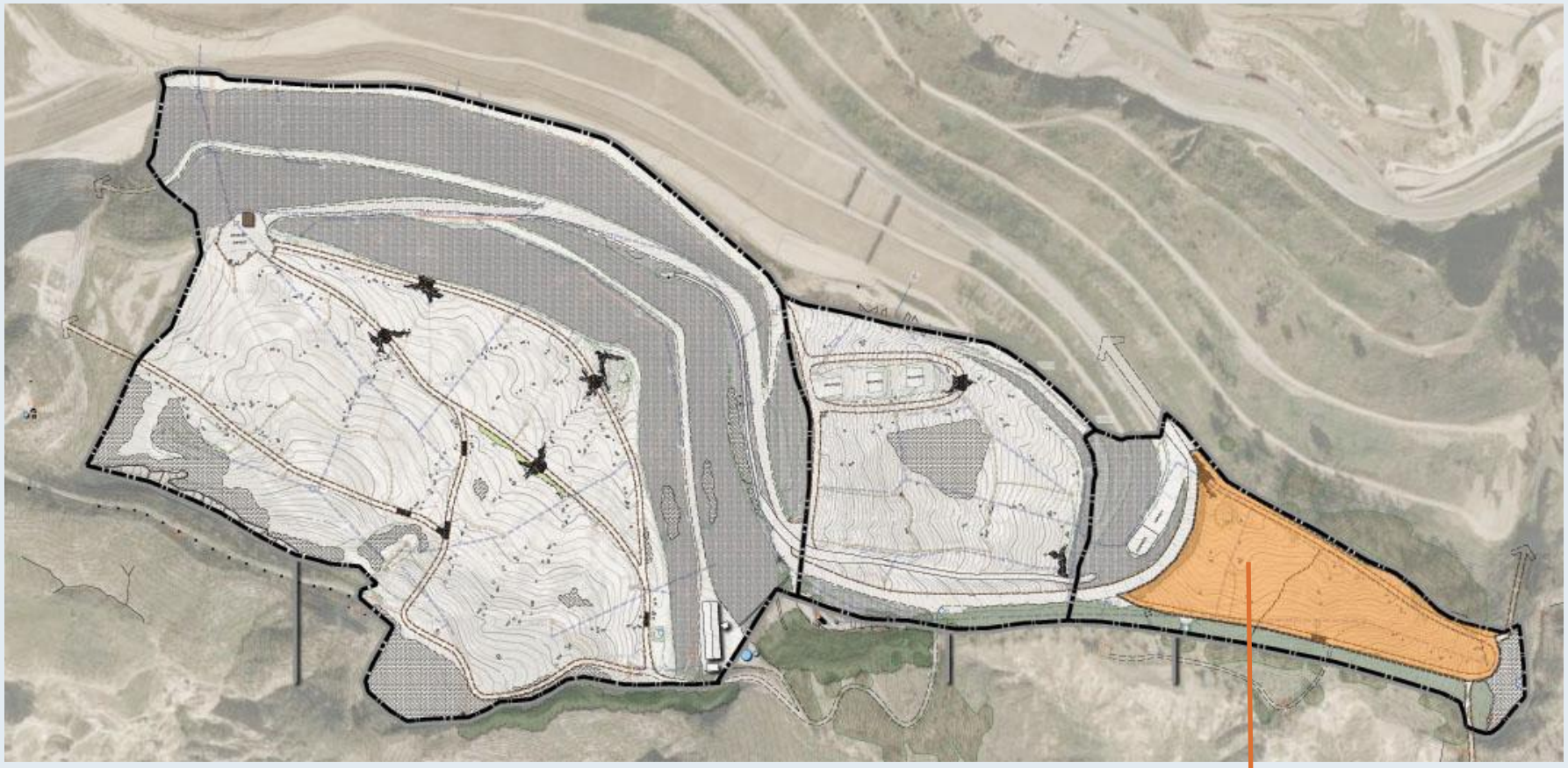

RESTORATION STRATEGY:
ESTABLISHMENT OF TRIAL SITE

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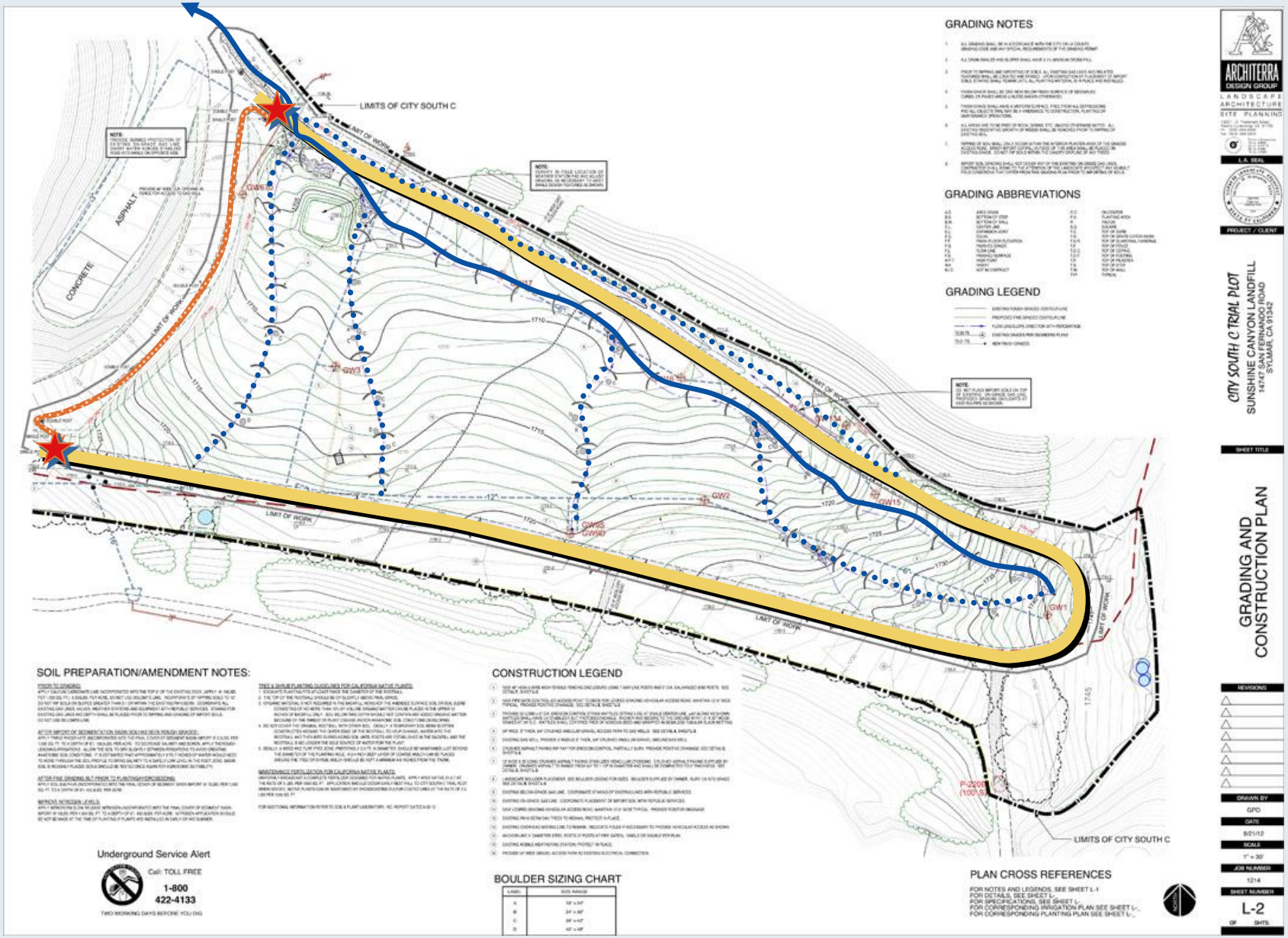

RESTORATION STRATEGY:

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MAP TO SUCCESS

- IMPROVE EXISTING SOIL CONDITIONS
- RESTRICT AND LIMIT VEHICLE ACCESS TO PADS
- CREATE MICRO-TOPOGRAPHIC CONDITIONS TO INCREASE THE VARIABILITY FOR SUCCESSFUL REVEGETATION
- ESTABLISH TRIAL PLOT SITE FOR ANALYSIS
- **SUPPLEMENT ANNUAL PRECIPITATION WITH TEMPORARY IRRIGATION SYSTEM TO HELP WITH ESTABLISHMENT OF NATIVE PLANT SPECIES**

RESTORATION STRATEGY:
ESTABLISHMENT OF A TEMPORARY IRRIGATION SYSTEM

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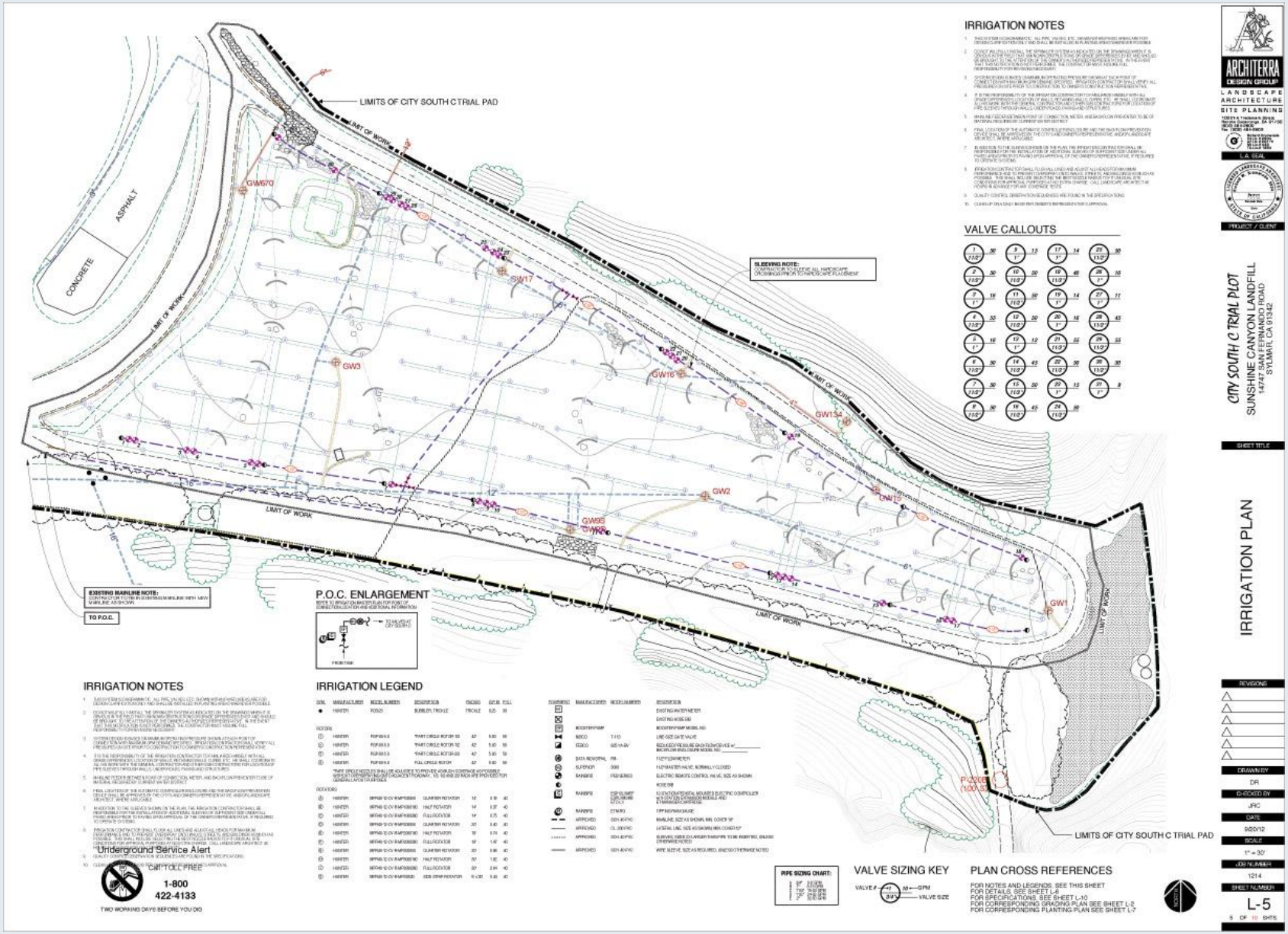

RESTORATION STRATEGY:

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MAP TO SUCCESS

- IMPROVE EXISTING SOIL CONDITIONS
- RESTRICT AND LIMIT VEHICLE ACCESS TO PADS
- CREATE MICRO-TOPOGRAPHIC CONDITIONS TO INCREASE THE VARIABILITY FOR SUCCESSFUL REVEGETATION
- ESTABLISH TRIAL PLOT SITE FOR ANALYSIS
- SUPPLEMENT ANNUAL PRECIPITATION WITH TEMPORARY IRRIGATION SYSTEM TO HELP WITH ESTABLISHMENT OF NATIVE PLANT SPECIES
- **TEST VARIOUS METHODS FOR PLANT ESTABLISHMENT AND EVALUATE TO DETERMINE BEST APPROACH FOR FUTURE SITES**

RESTORATION STRATEGY:
PROPOSED SEEDING METHODS AND PLANTING PLAN

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HYDROSEEDING

SOIL IMPRINTING

HAND BROADCAST SEEDING

BROADCAST AND CHAIN HARROW

CONTAINER PLANTS

RESTORATION STRATEGY:
PROPOSED SEEDING METHODS AND PLANTING PLAN

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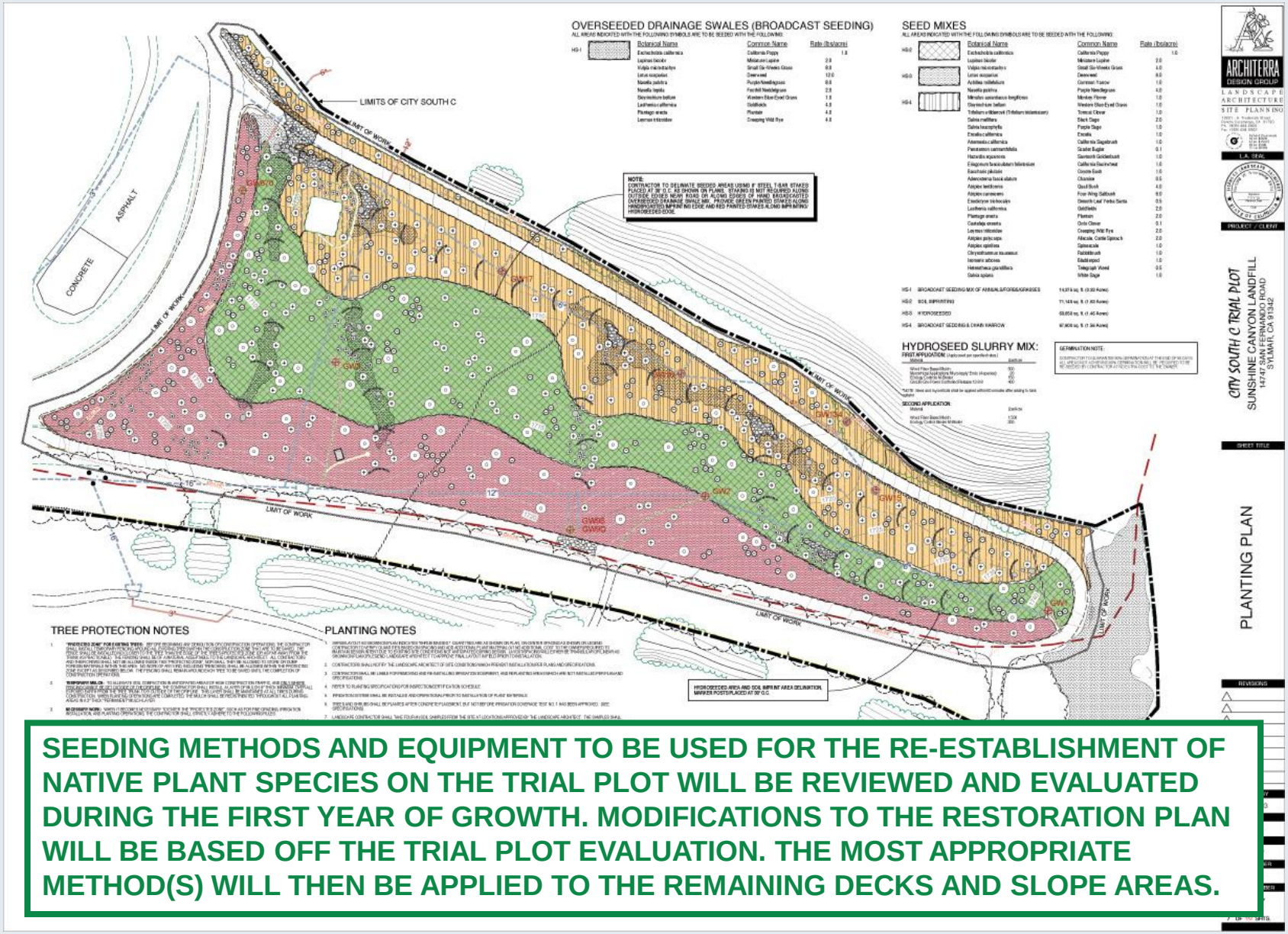

SEEDING METHODS AND EQUIPMENT TO BE USED FOR THE RE-ESTABLISHMENT OF NATIVE PLANT SPECIES ON THE TRIAL PLOT WILL BE REVIEWED AND EVALUATED DURING THE FIRST YEAR OF GROWTH. MODIFICATIONS TO THE RESTORATION PLAN WILL BE BASED OFF THE TRIAL PLOT EVALUATION. THE MOST APPROPRIATE METHOD(S) WILL THEN BE APPLIED TO THE REMAINING DECKS AND SLOPE AREAS.

RESTORATION STRATEGY:

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MAP TO SUCCESS

- IMPROVE EXISTING SOIL CONDITIONS
- RESTRICT AND LIMIT VEHICLE ACCESS TO PADS
- CREATE MICRO-TOPOGRAPHIC CONDITIONS TO INCREASE THE VARIABILITY FOR SUCCESSFUL REVEGETATION
- ESTABLISH TRIAL PLOT SITE FOR ANALYSIS
- SUPPLEMENT ANNUAL PRECIPITATION WITH TEMPORARY IRRIGATION SYSTEM TO HELP WITH ESTABLISHMENT OF NATIVE PLANT SPECIES
- TEST VARIOUS METHODS FOR PLANT ESTABLISHMENT AND EVALUATE TO DETERMINE BEST APPROACH FOR FUTURE SITES
- **INCREASE FREQUENCY OF MAINTENANCE**

RESTORATION STRATEGY:
CONCEPTUAL LANDSCAPE MASTER PLAN

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FEATURE LEGEND

EXISTING FEATURES / STRUCTURES

- Existing Weather Station
- Existing Gas Well
- Existing Gas Line (underground)
- Existing Gas Line (on-grade)
- Existing Roads to be abandoned for revegetation
- Existing Roads to remain
- Existing Educational Observation Deck
- Existing Water Tanks
- Existing Gas Probe
- Existing Poles
- Existing PM10 Berm Misting System

GRADING FEATURES / STRUCTURES

- Existing Topography (1 Foot Contours)
- Proposed Grades (1 Foot Contours)
- Proposed Swale Lines
- Proposed Open Fencing Enclosure
- Proposed 24" Wide Clear Monitoring Path of Compacted Gravel
- Stabilized cobble/rip rap Crossing at Access Roads
- Rip Rap Cobble at Drainage Collection Points
- Boulder Accents with Graded Swales and Collection Points
- Existing Concrete Drainage Channel
- Existing Exposed Rock Cliffside

EXISTING VEGETATION PATTERNS / REVEGETATION

- Existing Oak Trees along PM10 Berm
- Existing CSS to remain with rehabilitated landscaping
- New CSS habitat on amended bermed soils and graded pads
- Existing Grassland species to remain
- New CSS habitat on existing 2:1 slopes
- New Grassland habitat within graded drainage swales
- Existing Eucalyptus Trees on perimeter slopes

PLANT PALETTE / SEED MIX

LONG-TERM COVER

Botanical Name	Common Name	Botanical Name	Common Name
Eschscholzia californica	California Poppy	*Eriogonum fasciculatum foliolosum*	California Buckwheat
Lupinus bicolor	Miniature Lupine	*Baccharis pilularis*	Coyote Bush
Vulpia microstachys	Small Six-Weeks Grass	*Adenostoma fasciculatum*	Chamise
Lotus scoparius	Deerweed	*Atriplex lentiformis*	Quail Bush
Achillea millefolium	Common Yarrow	*Atriplex canescens*	Four-Wing Saltbush
Nassella pulchra	Purple Needlegrass	*Eriodictyon trichocalyx*	Smooth-Leaf Yerba Santa
Mimulus auranticus longiflorus	Monkey Flower	*Lasthenia californica*	Goldfields
Sisyrinchium bellum	Western Blue-Eyed Grass	*Plantago erecta*	Plantain
Trifolium willdenovii (Trifolium tridentatum)	Tomcat Clover	*Camissonia exserta*	Ovis Clover
Salvia mellifera	Black Sage	*Leymus triticoides*	Creeping Wild Rye
Salvia leucophylla	Purple Sage	*Atriplex polycarpa*	Allscale, Cattle Spinach
Encelia californica	Encelia	*Atriplex spinifera*	Spinescale
Artemesia californica	California Sagebrush	*Chrysothamnus nauseosus*	Rabbitbrush
Penstemon centranthifolia	Scarlet Bugler	*Isomeris arborea*	Bladderpod
Hazardia squarrosa	Sawtooth Goldenbush		